

## DETAILED ACTION

### *Examiner's Amendment*

1. An examiner's amendment to the record appears below. Should the changes and/or additions be unacceptable to applicant, an amendment may be filed as provided by 37 CFR 1.312. To ensure consideration of such an amendment, it **MUST** be submitted no later than the payment of the issue fee.
2. Authorization for this examiner's amendment was given in a telephone interview with Joseph Funk on 1/18/2010.
3. The application has been amended as follows:
4. **Claim 1** has been amended to read "A method of pumping a wide bandwidth optical parametric oscillator to provide mid-IR radiation output, comprising the step of pumping the optical parametric oscillator with a Thulium laser using a laser wavelength of about 2 microns and operating by itself as a pump source for the optical parametric oscillator, wherein the optical parametric oscillator includes two zinc germanium phosphide non-linear crystals, ~~[and]~~ wherein each of the crystals generates a signal beam and an idler beam that are all part of the output from the optical parametric oscillator, and wherein the signal beams and idler beams generate four distinct wavelengths."
5. **Claim 5** has been amended to read, "A method of pumping an optical parametric oscillator without utilizing Holmium, comprising the step of pumping the optical parametric oscillator with a Thulium laser using a laser wavelength of about 2 microns output, wherein the optical parametric oscillator includes two zinc germanium phosphide

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crystals, and wherein each of the crystals generates a signal beam and an idler beam, ~~[and]~~ wherein each of said crystals generates a signal beam and an idler beam that are all part of an output from the optical parametric oscillator, and wherein the signal beams and idler beams generate four distinct wavelengths."

6. **Claim 9** has been amended to read, "Apparatus for generating infrared radiation, comprising the combination of:

a Thulium laser using a laser wavelength of about 2 microns; and

an optical parametric oscillator pumped by said Thulium laser, wherein said optical-parametric oscillator is in the form of a ring, wherein said optical parametric oscillator includes two ZnGeP<sub>2</sub> non-linear crystals, and wherein the two ZnGeP<sub>2</sub> non-linear crystals are configured to generate four distinct wavelengths."

7. **Claim 19** has been amend to read, "Apparatus for generating infrared radiation, comprising the combination of:

a Thulium laser using a laser wavelength of about 2 microns; and

an optical parametric oscillator pumped by said Thulium laser wherein said optical parametric oscillator is double resonant, wherein said optical parametric oscillator includes two ZnGeP<sub>2</sub> non-linear crystals, and wherein the two ZnGeP<sub>2</sub> non-linear crystals are configured to generate four distinct wavelengths.

8. **Claims 11, 13, 21, and 23** are cancelled.

#### ***Reasons for Allowance***

9. The following is an examiner's statement of reasons for allowance: The closest prior art is US 6,358,243 which uses a single ZGP crystal to generate two output wave

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lengths. Further, while it is known to use multiple crystals to increase efficiency, or generate difference frequency mixing as shown in US 6,215,800, the prior art does not demonstrate using two zinc germanium phosphide crystals to output four distinct wavelengths from the OPO.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

### ***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to MICHAEL CARTER whose telephone number is (571)270-1872. The examiner can normally be reached on Monday-Friday, 7:00 a.m.-4:30 p.m., EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Minsun Harvey can be reached on (571) 272-1835. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/MC/

/Minsun Harvey/  
Supervisory Patent Examiner, Art Unit 2828